MAE 301/501 HOMEWORK–4 DUE ON THURSDAY, OCTOBER 14

One goal for this course is for you to develop your skill in effectively communicating mathematics. With this in mind, you should clearly write up your solutions. Solutions with little or no justification will receive little or no credit.

(1) (a) Read the teacher version of Lesson 18 from Module 3 of the New York State Precalculus and Advanced Topics Modules, linked below.

(b) On page 298 of the module the authors graph the functions $y = t(v)$ and $y = v(t)$. Keeping in mind the ideas from the article on inverse functions, describe mathematical problems with this graph.

(c) Comment on the meaning of the intersection point, as discussed in the module.

(d) Find and carefully explain 1-2 other mathematical inconsistencies or misconceptions that are embedded in this module.

`https://www.engageny.org/resource/precalculus-and-advanced-topics-module-3-topic-c-lesson-18`.

(2) Finish sketching the graphs of each of the four composite functions we were working on in class.

(3) (a) Suppose $f(x)$ and $g(x)$ are real-valued functions with domain consisting of the real numbers. Suppose f and g are both injective functions. Determine whether or not $g(f(x))$ must also be injective, and prove your result.
(b) Suppose $f(x)$ and $g(x)$ are real-valued functions with domain consisting of the real numbers. Suppose f and g both surject onto the real numbers. Determine whether or not $g(f(x))$ must also be surjective, and prove your result.
(c) Give an example of two functions, $f(x)$ and $g(x)$, coming from the high school mathematics curriculum, for which $g(x)$ is injective but $g(f(x))$ is not injective. Explain.